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## FRESH WATER BIOLOGY

Teachers in America have been eagerly awaiting this volume for several years. The knowledge of the plans of the editors and publishers, including as they have the collaboration of a large number of active biologists, has inevitably become wide spread. The need of such a work, planned on a scale that would be at once liberal and feasible, has been so genuine that it was assured in advance of a very wide use among teachers and working biologists.

The unanimous verdict will be that every reasonable expectation has been met by Professors Ward and Whipple and their helpers, in spite of the fact that the delays inevitable in getting such a synthetic task before the public will cause many of the contributors themselves to feel the need of revising their work by the time of its first appearance. All teachers of Biology, all advanced students of any group, all amateurs who use the microscope on living things, will find "Fresh Water Biology" a necessary part of their equipment.

The volume is, in many ways, very close to the kind of work which has long been fostered and advanced by the American Microscopical Society and its Transactions. An organized interest in limnological work was manifest as early as 1899, at which meeting a Limnological Commission, consisting of Professors Birge, Eigenmann, Kofoed, Ward and Whipple, was appointed to "unify, extend, and stimulate limnological work in this country." The following year this Commission made a report which anticipated much of the ecological work done since with the fresh-water forms of this country, and unquestionably gave inspiration and impetus to the studies on which this book is based. While the volume cannot be listed among the annual "*Transactions*" of the Society, certain it is that much of the contributory work leading to this fine showing in American fresh-water Biology has been done by members of this Society and published in one form or another in its *Transactions*.

So close is this enterprize to what this Society has been encouraging in every possible way for many years, that the pages of the *Transactions* are now freely offered, the editor and collaborators,

pending new editions of the book, for such supplementary and revisional statements as may be necessary from time to time to keep the accounts and keys of the various groups up to date. Such a cooperative arrangement would contribute greatly both to the convenience of our membership and to the most effective use of this manual.

The work is much too compendious and condensed to allow an adequate statement even of its scope, much less to bring to our readers any of its specific contents. In general the material presented is to be classified under three headings: (1) General discussion of the conditions of life and of the effective study of organisms; (2) the biological conditions, method of collection, culture and preservation of the special groups; and (3) systematic keys, with descriptions and illustrations of the classes, orders, families, genera, and representative American species of the groups treated.

Under the first head may be included the introductory chapter by Professor Ward, the chapter on "Conditions of Existence" by Professor Shelford, on "Methods of Collecting and Photographing" by Professor Rieghard, and the concluding chapter by Professor Whipple on "Technical and Sanitary Problems," as related to fresh waters. The biological features of the special groups are treated at the beginning of the appropriate chapters. The chapters on Bacteria, Larger Aquatic Vegetation, and Aquatic Vertebrates are confined to this aspect, making no effort at systematic display.

The following experts furnish the systematic chapters: Edgar W. Olive, Blue-green Algæ; Julia W. Snow, Other Fresh Water Algæ; C. H. Edmondson, Amœboid Protozoa; H. W. Conn and C. H. Edmondson, Flagellate and Ciliate Protozoa; Edward Potts, The Sponges; Frank Smith, Hydra and Other Fresh Water Hydrozoa; Caroline E. Stringer, The Free-living Flatworms; Henry B. Ward, Parasitic Flatworms; Wesley R. Coe, The Nemertean; N. A. Cobb, Free-living Nematodes; H. B. Ward, Parasitic Roundworms; H. S. Jennings, The Wheel Animalcules; H. B. Ward, Gastrotricha; Frank Smith, Aquatic Chætopods; J. Percy Moore, The Leeches; A. S. Pearse, The Fairy Shrimps; E. A. Birge, The

Water Fleas; C. Dwight Marsh, Copepoda; R. W. Sharpe, Ostracoda; A. E. Ortman, Higher Crustaceans; R. H. Wolcott, The Water Mites; James G. Needham, Aquatic Insects; Charles B. Davenport, Moss Animalcules; Bryant Walker, The Mollusca.

Two devices in the arrangement of the systematic matter call for comment. The guide numbers in the artificial keys are arranged in accordance with a plan developed by Professors Forbes and Smith at the University of Illinois. Each guide line begins with a number. In addition to its own appropriate number which leads, there follows in parentheses the alternative number (or numbers) which indicates the contrasted line to which the seeker must go if that particular legend is not diagnostic. This is true both of the earlier and the later guide lines in a given series. If a given key line is acceptable the further guiding number is at the close of the line. The device thus gives a perfect system of cross references both forward and backward between categories of a given grade. This is unnecessary in brief keys; but where there are scores of intervening subordinate categories it is a great convenience. The name and description of a species, all the supplementary biological facts concerning it and the illustration are included in a solid panel between its own key line and the next. This gives a convenient compactness which is very satisfying.

The general impression which follows examination of the book is the perfectly enormous amount of material condensed into its somewhat more than 1000 pages. This means, of course, great brevity, and yet no one interested in these groups can feel that the interesting and important matter has been left out. To one whose studies are confined largely to a single group there must come a renewed and enlarged sense of the representative character of the fresh-water organisms. One has brought home to him also the vast incompleteness of our records of the American distribution of even the better known fresh-water species. It ought to be possible in connection with the extended use and further revision of such a work as this to get a better account of specific range in this country.

It seems ungenerous to mention slight imperfections where so much has been brought to our aid. However, the appearance

of the chapters on Protozoa and Oligochætes is marred by the use of occasional cuts too heavy and opaque to give any true idea of the delicacy of the organisms. Figure 982 of *Chaetogaster* is an example of this.

A list of important references, in no case purporting to be a complete bibliography, concludes each chapter. An adequate index, including important descriptive terms and all of the scientific names used in the keys, concludes the book.

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Fresh Water Biology, by Henry B. Ward and G. C. Whipple, with a staff of Specialists collaborating. Pages ix and 1111, with 1547 text figures. John Wiley and Sons, New York and London, 1918. Price, \$6.00.

#### AN INTRODUCTION TO THE HISTORY OF SCIENCE

Nothing which has come to the attention of the reviewer puts more convincingly the meaning of the history of science than the preface of this little book by Professor Libby. "The history of science has something to offer to the humblest intelligence. It is a means of imparting a knowledge of scientific facts and principles to unschooled minds.

"The history of science is an aid in scientific research. It places the student in the current of scientific thought, and gives him a clue to the purpose and necessity of the theories he is required to master. It presents science as the constant pursuit of truth rather than the formulation of truth long since revealed; it shows science as progressive rather than fixed, dynamic rather than static, a growth to which each may contribute.

"It is only by teaching the sciences in their historical development that the schools can be true to the two principles of modern education, that the sciences should occupy the foremost place in the curriculum and that the individual mind in its evolution should rehearse the history of civilization.

"The history of science should be given larger place than at present in general history. History of science studies the past for the sake of the future. It is a story of continuous progress. It is rich in biographical material. It shows the sciences in their interrelations, and saves the student from narrowness and premature specialization. It affords a unique approach to the study